IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: EDWARDS et al.	Confirmation No: 3037
Appl. No.	: 09/508,512	
Filed	: March 24, 2000	
Title	: SELECTIVE MONITORING OF TRITIUM-CONTAINING SPECIES IN A GAS	
TC/A.U.	: 1743	
Examiner	: L. Cross	
Docket No.:	: EDWA3001/REF	
Customer No:	: 23364	

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is in response to the Official Action of October 19, 2004, in connection with the above-identified application. The period for response to this Official Action has been extended to expire on April 19, 2005, by the filing herewith of a Petition for a three-month extension of time.

Applicants acknowledge with appreciation the indication in the Official Action that claims 53-56, 58, 64, 74 and 75 contain allowable subject matter and would be allowed if rewritten in independent form. Applicants believe that all of the claims in the application are in fact patentable over the prior art of record and for the present time have not rewritten these claims in independent form. Of course, these claims still remain allowable.

The rejections of claims 42-52, 57, 60-64, 66-73, 76 and 77 under 35 USC 103 as being unpatentable over Atomic Energy (GB Patent 1,092,797) in view of the U.S. patent to Saito et al. **or** Bourne et al. have been carefully considered but are most respectfully traversed.

The Official Action urges that Atomic Energy teaches detection of tritium in air and vapors. However, it is recognized that Atomic Energy differs from the presently claimed invention in that there is no disclosure of a hygroscopic material on the scintillator element. In the Official Action it is also urged that both Saito et al and Bourne et al teach that tritium can be collected by being absorbed on an absorbent material, such as silica gel or zirconium alloy getters. Both references are said to teach that in monitoring tritium in air, the water content in air is absorbed by the absorbent, followed with measuring the radioactivity by scintillation counting. Column 1, lines 58-68 of Saito et al and column 1, lines 59-68, col. 3, lines 24-43 of Bourne et al. are specifically cited in the rejection.

It is further urged that it would have been obvious to one of ordinary skill in the art to incorporate a hygroscopic material, such as silica gel or zirconium alloy, to the scintillator element of Atomic Energy to allow any tritium in the air to be absorbed onto the scintillator element. Such would assure that tritium is effectively collected and assure that the measurement is accurate. These rejections having been carefully considered are most respectfully traversed.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

As correctly observed by the Examiner, Atomic Energy discloses a nuclear radiation detector for the detection of tritiated water vapour. The detector has a particular geometry, so that a gas to be monitored is made to flow in contact with walls made from scintillation material. This detector allows a continuous monitoring of a gas. However, as would be appreciated by one of ordinary skill in the art, there is no mention therein that the scintillation material could be covered by hygroscopic material and that it would provide any advantageous effect. The prior art must contain the motivation to modify the reference and the expectation of success. This motivation may not be found in Applicants' specification. In re Fritch, 23 USPQ 1780, 1784(Fed Cir. 1992) ("It is impermissible to engage in hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps.).

The Examiner considers that it would be obvious to provide a layer of hygroscopic material onto the scintillation material in view of the teachings of the paragraph of column 1, lines 58-68 of Saito et al. Applicants respectfully disagree with this statement which is specifically traversed. In this particular paragraph of Saito et al., the skilled person learns that in methods for monitoring tritiated water vapour, it is known to absorb water vapour in silica gel for a certain period of time, and then to measure the radioactivity thereof "by the liquid scintillation counting method" (see col.1, line 61).

In other words, this passage of Saito et al. clearly refers to the well known, and already largely discussed, technique of liquid scintillation. In the liquid scintillation method (see Schellenberg, col.1, lines 26-49), the radioactive isotopes to be detected are dissolved in a liquid solution containing scintillator material, and the vessel containing this liquid solution is placed in an instrument with photomultiplier tube to observe and count the scintillations.

The teachings that the skilled person will derive from Saito et al. are thus that it is possible to collect water vapour using an adsorbent such as silica gel; and then to dissolve the silica gel in a liquid solution containing scintillator material to perform the scintillation counting in a liquid scintillation spectrometer. In other words, Saito et al. describe a batchwise process, wherein water vapour is collected using a silica gel sample, and the silica gel sample is then processed according to the liquid scintillation method to detect radioactivity.

Saito et al. do however not suggest providing a layer of hygroscopic material onto a solid scintillator in order to perform a continuous detection of tritiated water vapour and other hydrophilic tritiated species in a gas, as is the case in the apparatus defined in claim 42. In other words, the combination of Atomic Energy with Saito et al. do not obviously lead to the invention of claim 42. Since the remaining claims are either directly or indirectly dependent on claim 42, these claims are equally patentable over the prior art and it is most respectfully requested that the rejection of these claims also be withdrawn.

Turning now to the Examiner's second obviousness rejection based on Atomic Energy in view of Bourne et al., applicants again respectfully disagree and traverse this rejection.

US Pat. 5,080,693 to Bourne et al. relates to the measure of tritium collected from a flowing inert gas stream. As described in the cited passage of col.3, lines 22-43, the system is based upon various zirconium alloys combined in a device called a getter

and on an on-line ion chamber. The getters adsorb tritium, in any of its common forms, at one temperature and release the tritium as gas at a higher temperature.

It is to be noted that the system of Bourne et al. does not permit the measurement of the tritium content in water vapour, contrary to the presently claimed invention. Indeed, it is clear from col.3, lines 8-12, that the tritium is collected from an inert gas stream. In addition, the getters are made from zirconium alloy, and water vapour is considered as a poison for such material (see col.4, lines 3-9). In other words, a zirconium alloy based getter is not comparable to a hygroscopic material as would be appreciated by one of ordinary skill in the art to which the invention pertains. One of ordinary skill would appreciate that it does not suggest or anticipate such material. As noted above, the motivation to combine the references must be found in the prior art and hindsight may not be relied upon to provide this teaching.

Furthermore, the system of Bourne et al. does not permit a continuous monitoring of the tritium, since the tritium is first collected in the getters during a time period (up to 66 hours; see col.5, line18), and then the getters are heated to release the collected tritium, the activity of which is measured in an ion chamber.

The technique of Bourne et al. is thus drastically different from the technique of the present invention. From the above it appears that Bourne et al. do not teach how to detect tritiated water vapour, nor the use of a hygroscopic material, and radioactivity is not even detected by scintillation. US Pat. 5,080,693 can therefore not suggest the provision of a hygroscopic layer on solid scintillator material for the continuous detection of tritiated water vapour. The combination of Atomic Energy with Bourne et al. can therefore not lead to the invention of claim 42 and this rejection should be withdrawn.

The Examiner will certainly appreciate that, according to the present invention, the provision of a hygroscopic layer on the solid scintillator material in the apparatus of claim 42 permits a continuous and reversible exchange of moisture with the gas in the direct vicinity of the scintillator material. This allows a continuous detection of tritiated

species in the gas flowing onto the hygroscopic scintillator element, and thus permits a real-time monitoring of tritium.

Furthermore, the provision of the thin layer of hygroscopic material on the scintillator material permits to achieve high selectivity and sensitivity levels. The range of beta-emission from tritium (average about 0.4 microns in liquid water) allows the tritium in the hygroscopic layer to excite the solid scintillator component of the hygroscopic scintillator element.

An important advantage of the presently claimed invention is thus to have proved that the provision of a layer of hygroscopic material on the solid scintillator permits a continuous and reversible exchange of moisture thereby allowing a continuous monitoring of tritium-containing species. This is drastically different from the method as disclosed in Saito et al. where hygroscopic material is used to collect tritiated water vapour during a certain period of time and then analyzed, in batch, by the liquid scintillation method.

Last but not least, the apparatus of claim 42 has an improved discriminating capability. As explained on page 5, first paragraph of Applicants's specification, the presently claimed apparatus of the invention, due to the presence of the hygroscopic layer on the solid scintillator, has a sensitivity to all tritium-containing species in the gas, substantially in proportion to the amount in which they dissolve (reversibly) with the water layer in the hygroscopic material on the solid scintillator. Since the relative toxicity of the tritiated species depends substantially on their entry into water in the human lung, the inventive apparatus provides a good indication of the overall radiotoxicity of the gas mixture due to all tritium species present.

In other words, all tritium species are detected with a sensitivity depending on their solubility in water, which mimics the process in the lungs where the body is exposed to tritium. The apparatus of claim 42 and method of claim 66 thereby allow a continuous and selective detection of tritium species in a gas, and provide a good

indication of the radiotoxicity of the detected gas to the human body. See for example claims 50-52 for continuous reading apparatus and the corresponding method of claims 70-72 which are not suggested by the prior art and are clearly patentable over the prior art. Accordingly, it is most respectfully requested that this aspect of the rejection be

Claim 59 is rejected under 35 USC 103(a) as being unpatentable over Atomic Energy and Saito et al or Bourne et al as applied to claims 42-52, 57, 60-64, 66-73, 76 and 77 above, and further in view of U.S. Patent 5,166,073 to Lefkowitz et al. It is recognized in the Official Action that neither Atomic Energy nor Saito et al or Bourne et al disclose zinc sulfide as a scintillator element.

Zinc sulfide is said to be also a known scintillation material for measuring tritium, as taught by Lefkowitz et al (col. 3, lines 24-25 and col. 5, lines 19-28. It is concluded that it would have been obvious to one of ordinary skill in the art to substitute the scintillator of Atomic Energy (plastic phosphor) with zinc sulfide because due to its known ability to effectively monitor tritium in the air. This rejection has been carefully considered but is most respectfully traversed. Even assuming arguendo, that this substitution was obvious to one of ordinary skill in the art, claim 59 is dependent on unobvious claim 42 as discussed above and the teachings of Lefkowitz et al do not overcome the deficiencies in the primary reference as discussed above. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claim 65 under 35 USC 103(a) as being unpatentable over Atomic Energy and Saito et al or Bourne et al as applied to claims 42-52, 57, 60-64, 66-73 76 and 77 above, and further in view of U.S. Patent 3,945,797 to Mlinko et al has been carefully considered but is most respectfully traversed for the above reasons.

Neither Atomic Energy nor Saito et al or Bourne et al disclose the addition of zeolite in the scintillator but the combination of these references also does not suggest the invention claimed in claim 42 for the reasons discussed above. Mlinko et al teaches a method for measuring tritium isotopes. The method involves contacting tritiated water

with a contact catalyst on an aluminum oxide substrate. The contact catalyst is responsible for absorbing the tritiated water. Mlinko et al teaches that zeolites are suitable for use due to their ability to readily absorb water allowing the tritium to firmly bond to it (col. 4, line 62 - col. 5, line 20) but this does not overcome the deficiencies of the primary references. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the above comments, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

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